

Amendment and Response - Under 37 C.F.R. §1.116 - Expedited Examining Procedure Page 2 of 9

Serial No.: 09/865,612

Confirmation No.: 4697

Filed: May 25, 2001

For: METHODS, COMPLEXES, AND SYSTEMS FOR FORMING METAL-CONTAINING FILMS ON
SEMICONDUCTOR STRUCTURESAmendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

18. (Original) A chemical vapor deposition system comprising:

a deposition chamber having a substrate positioned therein;

a vessel containing a precursor comprising one or more complexes of the

formula:



wherein:

M is a group IVB, VB, or VIB metal;

each R^1 , R^2 , R^3 , and R^4 is independently H or an organic group;

L is selected from the group of CO, NO, CN, CS, CNR^5 , R^6CN , or R^7 ,

wherein each R^5 , R^6 , and R^7 group is independently an organic group;

$x = 1$ to 4 ; and

$y = 1$ to 4 ; and

a source of inert carrier gas for transferring the precursor to the chemical vapor deposition chamber.

19. (Original) A chemical vapor deposition system comprising:

a deposition chamber having a substrate positioned therein;

a vessel containing a precursor composition comprising one or more complexes

of the formula:



wherein:

M is a Group IVB, VB, or VIB metal;

each R^1 , R^2 , R^3 , and R^4 is independently H or an organic group;

Amendment and Response - Under 37 C.F.R. §1.116 - Expedited Examining Procedure Page 3 of 9

Serial No.: 09/865,612

Confirmation No.: 4697

Filed: May 25, 2001

For: METHODS, COMPLEXES, AND SYSTEMS FOR FORMING METAL-CONTAINING FILMS ON SEMICONDUCTOR STRUCTURES

each L is independently CO, NO, CN, CS, CNR⁵, R⁶CN, or R⁷, wherein

each R⁵, R⁶, and R⁷ group is independently an organic group;

x = 1 to 4; and

y = 1 to 4.

20. **(Currently Amended)** The system of claim 38 [[19]] wherein the deposition chamber is adapted for forming a metal-containing film comprising vaporizing the precursor composition and directing it toward the semiconductor substrate or substrate assembly using a chemical vapor depositional technique.
21. **(Original)** The system of claim 20 wherein the chemical vapor deposition technique comprises flash vaporization, bubbling, microdroplet formation, or combinations thereof.
22. **(Original)** The system of claim 20 wherein the precursor composition is vaporized in the presence of a carrier gas.
23. **(Original)** The system of claim 20 wherein the precursor composition is vaporized in the presence of a reaction gas.
24. **(Original)** The system of claim 23 wherein the reaction gas is selected from the group of H₂, SiH₄, Si₂H₆, NH₃, N₂H₄, PH₃, AsH₃, GeH₄, t-BuSbMe₂, H₂S, H₂Se, Te(allyl)₂, and combinations thereof.
25. **(Original)** The system of claim 19 wherein each R¹, R², R³, and R⁴ group is independently H or a (C₁-C₃₀)organic group.
26. **(Original)** The system of claim 19 wherein the complex is a monomer.

Amendment and Response - Under 37 C.F.R. §1.116 - Expedited Examining Procedure Page 4 of 9

Serial No.: 09/865,612

Confirmation No.: 4697

Filed: May 25, 2001

For: METHODS, COMPLEXES, AND SYSTEMS FOR FORMING METAL-CONTAINING FILMS ON
SEMICONDUCTOR STRUCTURES

27. (Original) The system of claim 19 wherein each R¹, R², R³, and R⁴ group is independently H or a (C₁-C₄)alkyl moiety.
28. (Original) The system of claim 19 wherein R⁷ is cyclopentadienyl or a substituted cyclopentadienyl.
29. (Original) The system of claim 19 wherein the precursor composition is a liquid.
30. (Original) The system of claim 19 wherein the metal is a Group VB metal.
31. (Original) The system of claim 30 wherein the metal is vanadium.
32. (Currently Amended) The system of claim 20 [[19]] wherein the metal-containing film is a Group IVB, VB, or VIB metal alloy film.
33. (Original) A chemical vapor deposition system comprising:
a deposition chamber having a semiconductor substrate or substrate assembly positioned therein;
a vessel containing a precursor composition comprising one or more complexes of the formula:
$$[(R^1)NC(R^2)C(R^3)N(R^4)]_xML_x$$

wherein:
M is a Group IVB, VB, or VIB metal;
each R¹, R², R³, and R⁴ is independently H or an organic group;
each L is independently CO, NO, CN, CS, CNR⁵, R⁶CN, or R⁷, wherein each R⁵, R⁶, and R⁷ group is independently an organic group;
x = 1 to 4; and

Amendment and Response - Under 37 C.F.R. §1.116 - Expedited Examining Procedure Page 5 of 9
Serial No.: 09/865,612
Confirmation No.: 4697
Filed: May 25, 2001
For: METHODS, COMPLEXES, AND SYSTEMS FOR FORMING METAL-CONTAINING FILMS ON SEMICONDUCTOR STRUCTURES

y = 1 to 4.

34. (Original) The system of claim 33 wherein each R¹, R², R³, and R⁴ is independently H or a (C₁-C₃₀)organic group.
35. (Original) The system of claim 33 wherein the complex is a monomer.
36. (Original) The system of claim 33 wherein each R¹, R², R³, and R⁴ group is independently H or a (C₁-C₄)alkyl moiety.
37. (Original) The system of claim 33 wherein R⁷ is cyclopentadienyl or a substituted cyclopentadienyl.
38. (Currently Amended) A chemical vapor deposition system comprising:
a deposition chamber having a semiconductor substrate or substrate assembly ~~positioned~~ positioned therein;
a vessel containing a precursor composition comprising one or more liquid complexes of the formula:
$$[(R^1)NC(R^2)C(R^3)N(R^4)]_xML_y$$

wherein:
M is a Group IVB, VB, or VIB metal;
each R¹, R², R³, and R⁴ independently H or a (C₁ - C₃₀)organic group;
each L is independently CO, NO, CN, CS, CNR⁵, R⁶CN, or R⁷, wherein
each R⁵, R⁶, and R⁷ group is independently an organic group;
x = 1 to 4; and
y = 1 to 4.